$$\int_{0}^{W_{sc}} \rho_F(z)dz \leq Q_c \qquad (2)$$

Cont D2

$W_{sc}$ denotes the width of the space charge region (i.e. the region with $|\vec{E}| \neq 0$) when the electric field reaches the critical field strength $E_c$. According to the invention, the layer thickness W should then be selected in such a way that the space charge zone reaches the second main surface 3 before the field strength takes on the critical value $E_c$. In this case, the integration in following equation (3) has to be carried out over the entire layer thickness W of the semiconductor body 1 between the pn-junction between the semiconductor body 1 and the body zone 4 and the second semiconductor surface 3. In other words, the integral in Equation (2) should, for example, reach at most the value 0.9 $Q_c$ so that, in the vertically structured power semiconductor component according to the invention, the following equation is satisfied:

$$\int_{0}^{W} \rho_F(z)dz \leq 0.9Q_c\,, \quad \rho_F = \int \rho dF\,. \qquad (3)$$

In the Claims:

D3

Claim 1(amended). A vertically structured power semiconductor component, comprising:

a semiconductor body of a first conductivity type and having a first main surface and a second main surface opposite said first main surface;

a body zone of a second conductivity type opposite of said first conductivity type introduced into said first main surface;

Cont D3

a zone of said first conductivity type disposed in said body zone;

a first electrode making contact with said zone and with said body zone;

a second electrode disposed on said second main surface;

an insulating layer disposed on said first main surface;

a gate electrode disposed above said body zone and separated from said body zone by said insulating layer; and

an intersection of said semiconductor body and said body zone defining a pn junction;

said semiconductor body having:

a layer thickness between said pn junction and said second main surface selected such that, when one of a maximum allowed blocking voltage and a voltage just less than this is applied between said first electrode and said second electrode, a space charge zone created in said semiconductor body meets said second main surface before a field strength E created by an applied blocking voltage reaches a critical value $E_c$ at which an electrical breakdown is reached; and

Cont D3

a specific sheet charge density $\rho_F(z)$ of a thin layer having a surface perpendicular to a direction z between said pn junction and said second main surface such that:

$$\int_0^W \rho_F(z)dz \leq 0.9Q_c \text{ , } \rho_F = \int \rho dF$$

in which ρ is the volume charge density, $Q_c$, the critical breakdown charge, denotes a critical value of the charge quantity Q at which the electrical breakdown is reached, said charge quantity Q being linked to said electric field strength E between said first electrode and said second electrode by the equations

$\int_0^W \rho_F(z)dz = Q$ and Poisson's equation $\nabla E = -4\pi\rho$ .

Add the Following New Claim:

Claim 12(new). A vertically structured power semiconductor component, comprising:

D4

a semiconductor body of a first conductivity type and having a first main surface and a second main surface opposite said first main surface;

a body zone of a second conductivity type opposite of said first conductivity type introduced into said first main surface;

a zone of said first conductivity type disposed in said body zone;

a first electrode making contact with said zone and with said body zone;

a second electrode disposed on said second main surface;

an insulating layer disposed on said first main surface;

a gate electrode disposed above said body zone and separated from said body zone by said insulating layer;

an intersection of said semiconductor body and said body zone defining a pn junction; and

a compensation region of said second conductivity type disposed below said body zone in said semiconductor body;

said semiconductor body having:

Cont D4

a layer thickness between said pn junction and said second main surface selected such that, when one of a maximum allowed blocking voltage and a voltage just less than this is applied between said first electrode and said second electrode, a space charge zone created in said semiconductor body meets said second main surface before a field strength E created by an applied blocking voltage reaches a critical value $E_c$ at which an electrical breakdown is reached; and

a specific sheet charge density $\rho_F(z)$ of a thin layer whose surface is perpendicular to a direction z between said pn junction and said second main surface such that:

$$\int_0^W \rho_F(z)dz \leq 0.9Q_c \text{ , } \rho_F = \int \rho dF$$

in which $\rho$ is the volume charge density, $Q_c$, the critical breakdown charge denotes a critical value of the charge

Cont D4

quantity Q at which the electrical breakdown is reached, said charge quantity Q being linked to said electric field strength E between said first electrode and said second electrode by the equations

$\int_0^W \rho_F(z)dz = Q$ and Poisson's equation $\nabla E = -4\pi\rho$ .